

## ACTUATION ASSISTANCE APPARATUS AND METHOD

### FIELD OF THE INVENTION

**[0001]** This invention pertains to assistance mechanisms for pressurized containers, and more particularly to apparatus for assisting actuation of tilt actuators for pressurized containers.

### BACKGROUND OF THE INVENTION

**[0002]** Various types of pressurized containers are used in commercial, personal care and food applications. Pressurized containers include a valve that must be opened to release the internal contents. Typically, an actuator opens the valve, thereby releasing the contents from the container. One type of valve is a tilt-action valve, which integrates a spout actuator. A load applied to the spout actuator causes the actuator to actuate and tilt. The tilting of the spout actuator tilts a valve stem and releases the contents from the container. A problem with current pressurized containers with this actuator-valve combination, which will be appreciated once the invention is understood, is that it tends to be difficult to actuate the spout actuator to tilt the valve stem. Spout actuators are generally short and provide a limited lever arm to actuate the spout actuator and typically only a single finger or thumb may be used to tilt the spout actuator. However, simply lengthening the spout actuator will not solve the problem because it becomes difficult to hold the pressurized container with one hand and still actuate the spout actuator.

### BRIEF SUMMARY OF THE INVENTION

**[0003]** It is an objective of the embodiment to provide an actuation assistance apparatus which reduces the actuation load required to actuate a spout actuator of a pressurized container.

**[0004]** It is a further objective of the embodiment to provide an actuation assistance apparatus which makes application of the actuation load, which actuates a spout actuator, easier by allowing the user to use multiple fingers to apply the actuation load to the actuation assistance apparatus, rather than requiring a single finger or thumb to press against the spout actuator as currently required.

**[0005]** In achieving the objectives of the current invention, the embodiment provides an actuation assistance apparatus comprising a base member having an aperture sized and configured to engage and slidably accept the spout actuator. A lever portion integrally attached to the base member comprises a radial extension arm and a downward depending arm. The radial extension arm is adapted to position the integrally attached downward depending arm beyond the radial periphery of the pressurized container. The downward depending arm configured to receive the actuation load.

**[0006]** A pressurized container assembly using an actuation assistance apparatus is also disclosed herein. The pressurized container system comprises a pressurized container for holding contents, a tilt-action valve for releasing the contents, a spout actuator which opens the tilt-action valve and an actuation assistance apparatus removably attached to the spout actuator.

**[0007]** The invention also has method aspects which involve using an actuation assistance apparatus to improve actuation of a spout actuator of a pressurized container. The method includes the steps installing an actuation assistance apparatus on the container and applying an actuation load to the actuation assistance apparatus, thereby actuating the actuator of the pressurized container.

**[0008]** Other aspects, objectives and advantages of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0009]** Figure 1 is a profile illustration of the pressurized container assembly including an actuation assistance apparatus.

**[0010]** FIG. 2 is an isometric illustration of a pressurized container assembly including an actuation assistance apparatus further illustrating features of the actuation assistance apparatus shown in FIG. 1.

**[0011]** FIG. 3 is an expanded axial view illustration of the base member of the actuation assistance apparatus as shown in FIG. 2.

**[0012]** FIG. 4 is an expanded cross-sectional illustration of the radial extension arm of the actuation assistance apparatus of FIG. 1.

## DETAILED DESCRIPTION OF THE INVENTION

**[0013]** The following disclosed embodiment further illustrates the invention but, of course, should not be construed as in any way limiting the scope.

**[0014]** FIG. 1 illustrates a pressurized container assembly 18 including an actuation assistance apparatus 20. The actuation assistance apparatus 20 assists actuation of the spout actuator 22 of the pressurized container 26 by providing a lever arm for the actuation load that causes the spout actuator 22 to actuate. The spout actuator 22 extends axially from the top of the pressurized container 26. The pressurized container 26 holds contents 28 that dispense as a result of a pressure differential between the inside 27 and the outside 29 of the pressurized container 26. The inside 27 being at a higher pressure relative to the outside 29. A tilt-action valve 30, within the pressurized container 26, opens to expose the contents 28 to the pressure differential forcing the contents 28 from the pressurized container 26. The spout actuator 22 is adapted to open the tilt-action valve 30 when the spout actuator 22 tilts as the result of radial. Opening the tilt-action valve 30 creates a passageway connecting the inside 27 with the outside 29 of the pressurized container 26. The passage way forms through the tilt-action valve 30, the spout actuator 22 and a dispensing hole 32. The pressure differential propels the contents 28 through the passageway, thereby exiting the pressurized container assembly 18.

**[0015]** As actuating a spout actuator may be difficult, specifically for people with weak, small or arthritic hands, the actuation assistance apparatus 20, further illustrated in FIG. 2, assists tilting of the spout actuator 22 providing an improvement over current pressurized containers. The actuation assistance apparatus 20 comprises a base member 40 and a lever portion 42. The base member 40 includes an aperture 44 having an inner periphery 46 being sized and configured to engage and to slidably accept the spout actuator 22, such that tilting of the base member 40 causes the spout actuator 22 to tilt. In the illustrated embodiment, the base member 40 and aperture 44 are formed by a cylindrical sleeve 48, having an axial length  $L$  (FIG. 1) being longer than the diameter of the inner periphery 46. Preferably the length ranges between about 0.2-0.6 inch and more preferably about 0.5 inch. If the length is too short, the base member 40 will pivot about the spout actuator 22 when tilted to actuate the spout actuator 22, rather than cause the spout actuator 22 to tilt, thereby failing to open the tilt-action valve 30. If the length of the cylindrical sleeve 48 is too long, the cylindrical sleeve 48 may interfere with the contents 28 as the contents 28 exit the dispensing hole 32.

**[0016]** As illustrated in FIGS. 2 and 3, the inner periphery 46 of the cylindrical sleeve 48 includes protrusions 50 that extend radially therefrom. The protrusions 50 facilitate engaging and slidably accepting the spout actuator 22. The protrusions 50, as illustrated, are formed by a first discontinuous cylindrical wall 52 of a first diameter and a second

discontinuous cylindrical wall 54 of a second diameter. The protrusions 50 project radially a distance between about 0.01 and about 0.03 inch. In other embodiments, the protrusions could include dimples, bumps, ridges, ribs or a combination thereof.

**[0017]** The lever portion 42 provides a lever arm that reduces the actuation load required to tilt the base member 40 that actuates the spout actuator 22. The lever portion 42 comprises a radial extension arm 56 and a downward depending arm 58 as shown in FIGS. 1 and 2. The radial extension arm 56 extends radially between a first end 60 and a second end 62. The first end 60 integrally attaches to the outer periphery 64 of the base member 40. The second end 62 attaches to the downward depending arm 58. The length of the radial extension arm 56 is determined such that the downward depending arm 58 extends radially beyond the outer periphery 66 of the pressurized container 24. In an embodiment, the radial extension arm 56 extends radially beyond the outer periphery 66 of the pressurized container 24.

**[0018]** The embodiment of the radial extension arm 56 comprises a vertical flange 68 and a top flange 70, as illustrated in FIGS. 3 and 4. The vertical flange 68 and top flange 70 are integrally attached to and extend radially outward from the outer periphery 64 of the base member 40. The vertical flange 68 depends vertically downward from the top flange 70 defining a "T" shaped cross-section. This configuration substantially maintains structural rigidity of the lever portion 42 and prevents twisting and bending of the radial extension arm 56 while reducing the amount of material required for manufacturing.

**[0019]** As illustrated in FIG. 1, the downward depending arm 58 is transverse to and depends from the radial extension arm 56 at an angle  $\alpha$ . The angle may range between about 90-130. In the illustrated embodiment, the angle is at about 110 degrees. The actuation load 80 is applied to the downward depending arm 58 of the lever portion 42 which causes the actuation assistance apparatus 20, including the base member 40, to tilt. Consequently, the tilting of the base member 40 causes the spout actuator 22 to actuate. One embodiment of the downward depending arm 58 includes a generally planar enlarged operating/press pad 74, as illustrated in FIG. 2. The enlarged operating/press pad 74 makes the lever portion 40 easier to press and grip. However, if the operating/press pad 74 becomes too large, it may be difficult for people with small hands to grip the pressurized container 26 and apply the actuation load 80 (FIG. 1) to the operating/press pad 74.

**[0020]** The actuation assistance apparatus 20 makes it easier to hold the pressurized container 26 and apply the actuation load 80 (FIG. 1) with a single hand (not illustrated), which is an improvement over current pressurized containers. This improvement is especially realized by users with small, arthritic or weak hands. The user holds the pressurized container 26 and the actuation assistance apparatus 20 between the palm and

fingers of a single hand. The user's palm and thumb press generally radially inward against a portion of the outer periphery 66 of the pressurized container 26 opposite the actuation assistance apparatus 20. The user's fingers press generally radially inward against the downward depending arm 58. The user squeezes its hand to apply the actuation load 80 to the downward depending arm 58, thereby causing the base member 40 and the spout actuator 22 to tilt opening the tilt-action valve 30.

**[0021]** The use of the terms "a" and "an" and "the" and similar referents in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. The terms "comprising," "having," "including," and "containing" are to be construed as open-ended terms (i.e., meaning "including, but not limited to,") unless otherwise noted. Recitation of ranges of values herein are merely intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value is incorporated into the specification as if it were individually recited herein. All methods described herein can be performed in any suitable order unless otherwise indicated herein or otherwise clearly contradicted by context. The use of any and all examples, or exemplary language (e.g., "such as") provided herein, is intended merely to better illuminate the invention and does not pose a limitation on the scope of the invention unless otherwise claimed. No language in the specification should be construed as indicating any non-claimed element as essential to the practice of the invention.

**[0022]** Preferred embodiments of this invention are described herein, including the best mode known to the inventors for carrying out the invention. Variations of those preferred embodiments may become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventors expect skilled artisans to employ such variations as appropriate, and the inventors intend for the invention to be practiced otherwise than as specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.